

What is claimed is:

1. A liner for a hydrothermal pressure vessel, said vessel having a wall defining a chamber and said liner comprising:

a porous layer positioned in said chamber of said vessel;

5 a non-porous layer positioned against said porous layer with said porous layer between said non-porous layer and said wall of said vessel;

a seal for coupling said non-porous layer to said wall to encapsulate said porous layer therebetween; and

10 means for establishing fluid communication with said porous material.

2. A liner as recited in claim 1 further comprising at least one connector extending through said wall and into contact with said porous layer for conveying operational information from said porous layer.

15 3. A liner as recited in claim 2 further comprising a pressure sensor for determining the pressure in said porous layer.

4. A liner as recited in claim 2 further comprising a chemical species sensor for determining the presence of a chemical species in said porous layer.

20 5. A liner as recited in claim 2 further comprising a flow sensor for determining the flow in said porous layer.

6. A liner as recited in claim 1 further comprising at least one partition positioned between said non-porous layer and said wall for dividing said porous layer into sections and for isolating said sections from each other.

7. A liner as recited in claim 1 wherein said porous layer is positioned adjacent said wall of said vessel.

8. A liner as recited in claim 1 further comprising an insulation layer positioned adjacent said wall of said vessel between said porous layer and
5 said wall of said vessel.

9. A liner as recited in claim 1 wherein said means in fluid communication with said porous layer for pumping a heat transfer fluid therethrough comprises a first connector for allowing said heat transfer fluid to flow into said porous layer, a second connector for allowing said heat transfer
10 fluid to flow out of said porous layer and a pump in fluid communication with said first connector.

10. A liner as recited in claim 1 further comprising a sensor for performing leak detection measurements, said sensor embedded in said porous layer for passing a signal through said wall.

11. A liner for a hydrothermal pressure vessel, said vessel having a wall defining a chamber and said liner comprising:

a porous layer positioned in said chamber of said vessel;

5 a non-porous layer positioned against said porous layer with said porous layer between said non-porous layer and said wall of said vessel;

a seal for coupling said non-porous layer to said wall to encapsulate said porous layer therebetween;

10 a partition positioned between said non-porous layer and said wall for dividing said porous layer into a first section and a second section and for isolating said sections from each other;

means in fluid communication with said first section of said porous layer for selectively pumping a heat transfer fluid therethrough; and

15 means for establishing fluid communication with said second section of said porous layer.

20 12. A liner as recited in claim 11 further comprising a first connector extending through said wall and into contact with said first section of said porous layer for conveying operational information from said first section of said porous layer and a second connector extending through said wall and into contact with said second section of said porous layer for conveying operational information from said second section of said porous layer.

13. A method for hydrothermal treatment of a reactant comprising the steps of:

5 providing a vessel, said vessel having a wall and defining a chamber, said wall having a liner formed with a porous layer and a non-porous layer, said non-porous layer sealed to said wall to encapsulate said porous layer therebetween;

introducing the reactant, an oxidizer and water into said chamber;

10 converting said reactant into reaction products by combining said reactant said oxidizer and said water together in said chamber; and

pumping a heat transfer fluid through said porous material to maintain a pre-selected temperature for the liner.

14. A method as recited in claim 13 wherein said pumping step is performed before said converting step to pre-heat said chamber.

15. A method as recited in claim 13 wherein said pumping step is performed during said converting step to cool said reactor vessel.

16. A method as recited in claim 13 wherein said pumping step is performed during said converting step to cool said non-porous layer of said liner.

17. A method as recited in claim 13 wherein said pumping step is performed during said converting step to recover heat generated from said converting step.

18. A method as recited in claim 13 wherein said pumping step is performed after said converting step to cool said liner to remove said liner from said vessel.

19. A method as recited in claim 13 wherein said converting step
5 occurs at a temperature of at least 374 degrees Celsius and a pressure of at least 25 bar.

20. A method as recited in claim 13 wherein said converting step occurs at a temperature of at least 374 degrees Celsius and a pressure of at least 220 bar.